US009085390B2

(12) **United States Patent**
Li et al.

(10) **Patent No.: US 9,085,390 B2**
(45) **Date of Patent: Jul. 21, 2015**

(54) **ADJUSTABLE STORAGE BOX**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/325,057**

(22) Filed: **Jul. 7, 2014**

(65) **Prior Publication Data**

US 2015/0014309 A1 Jan. 15, 2015

(30) **Foreign Application Priority Data**

Jul. 12, 2013 (CN) 2013 1 02925572

(51) **Int. Cl.**
B65D 21/08 (2006.01)
B65D 6/18 (2006.01)

(52) **U.S. Cl.**
CPC ***B65D 21/086*** (2013.01); ***B65D 11/1833*** (2013.01)

(58) **Field of Classification Search**
CPC B65D 7/32; B65D 7/30; B65D 7/28; B65D 7/24; B65D 11/1873; B65D 11/18; B65D 11/1866; B65D 21/086; B65D 21/068; B65D 88/526; B65D 88/10
USPC 220/4.33, 4.28, 7, 6, 8, 629, 628; 206/600, 386
See application file for complete search history.

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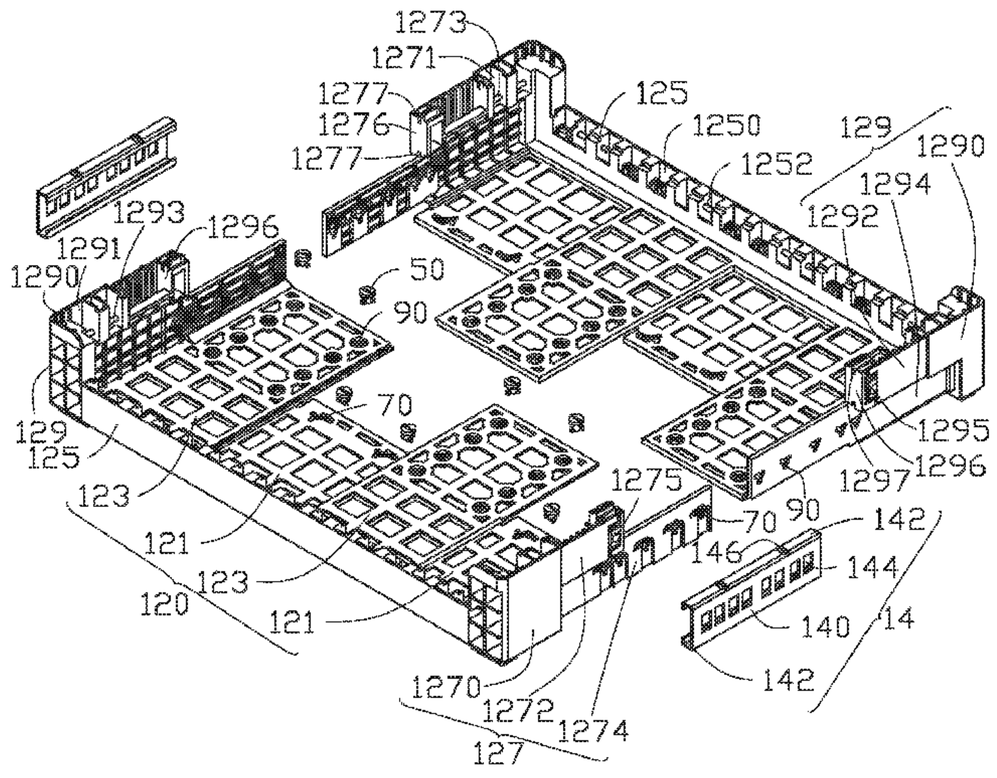
(57) **ABSTRACT**

A storage box includes a base, two opposite first side plates coupled to the base and two opposite second side plates coupled to the base and connecting the two first side plates. The base includes two base plates coupled to each other. Each base plate includes a fixing flange, a first sliding flange and a second sliding flange extending from the fixing flange. The first side plates are pivotally coupled to the fixing flanges of the base plates. The second side plates each include two sliding plates respectively and pivotally coupled to the first sliding flange of a corresponding one of the base plates and the second sliding flange of the other one of the base plates. The two base plates are configured to be movable relative to each other. The two sliding plates of each second side plate are configured to be movable relative to each other.

17 Claims, 14 Drawing Sheets



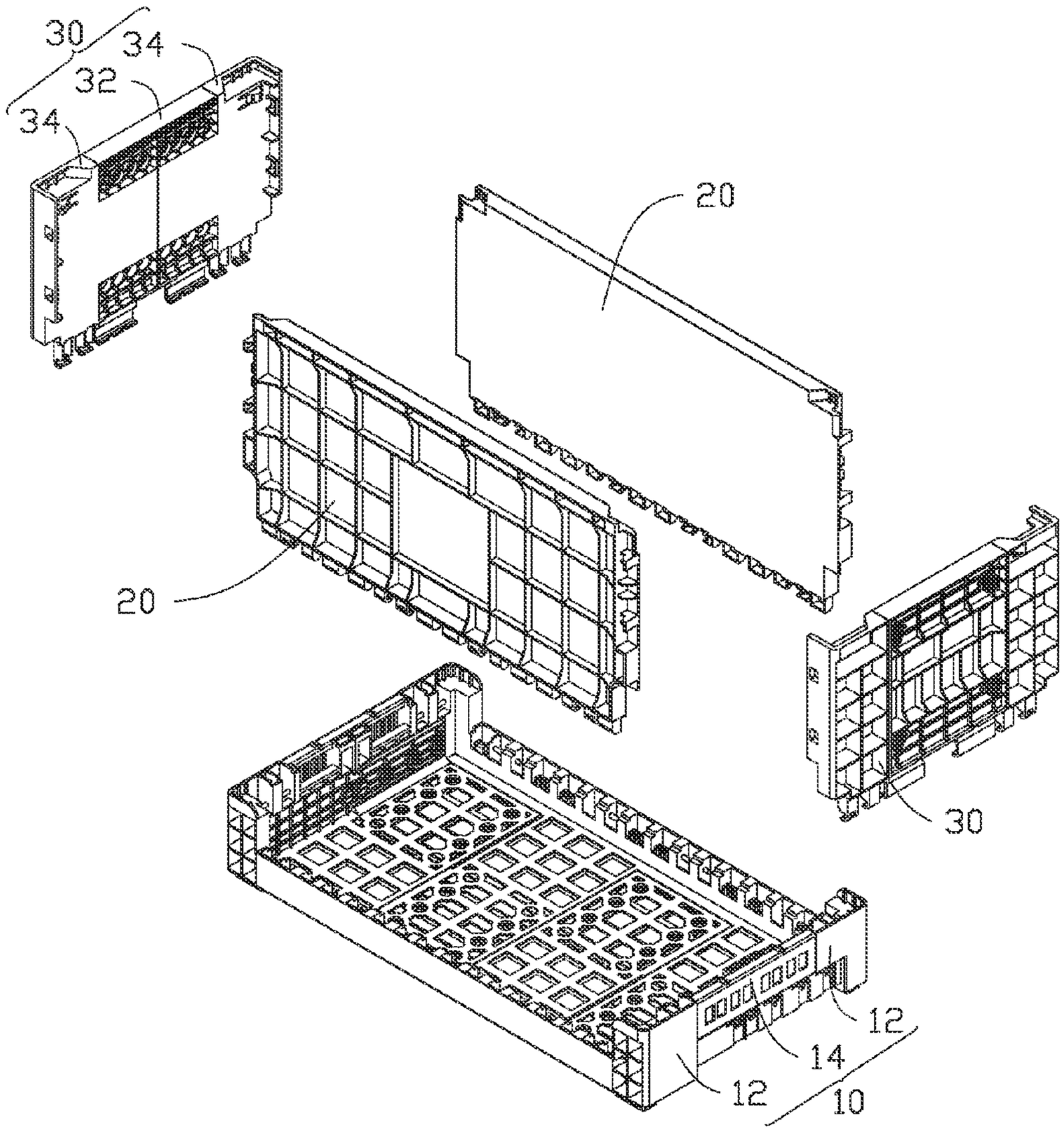


FIG. 1

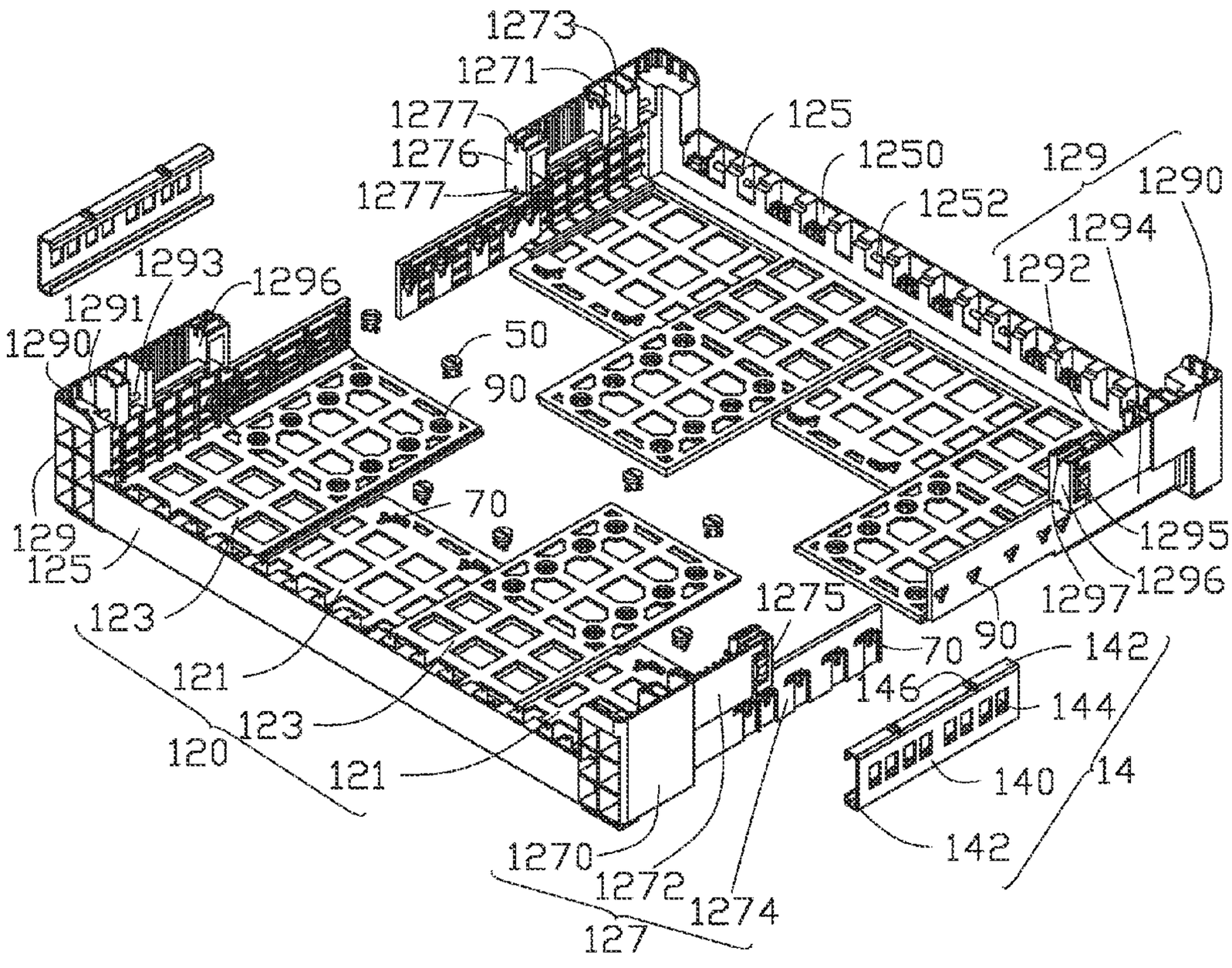

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FIG. 2

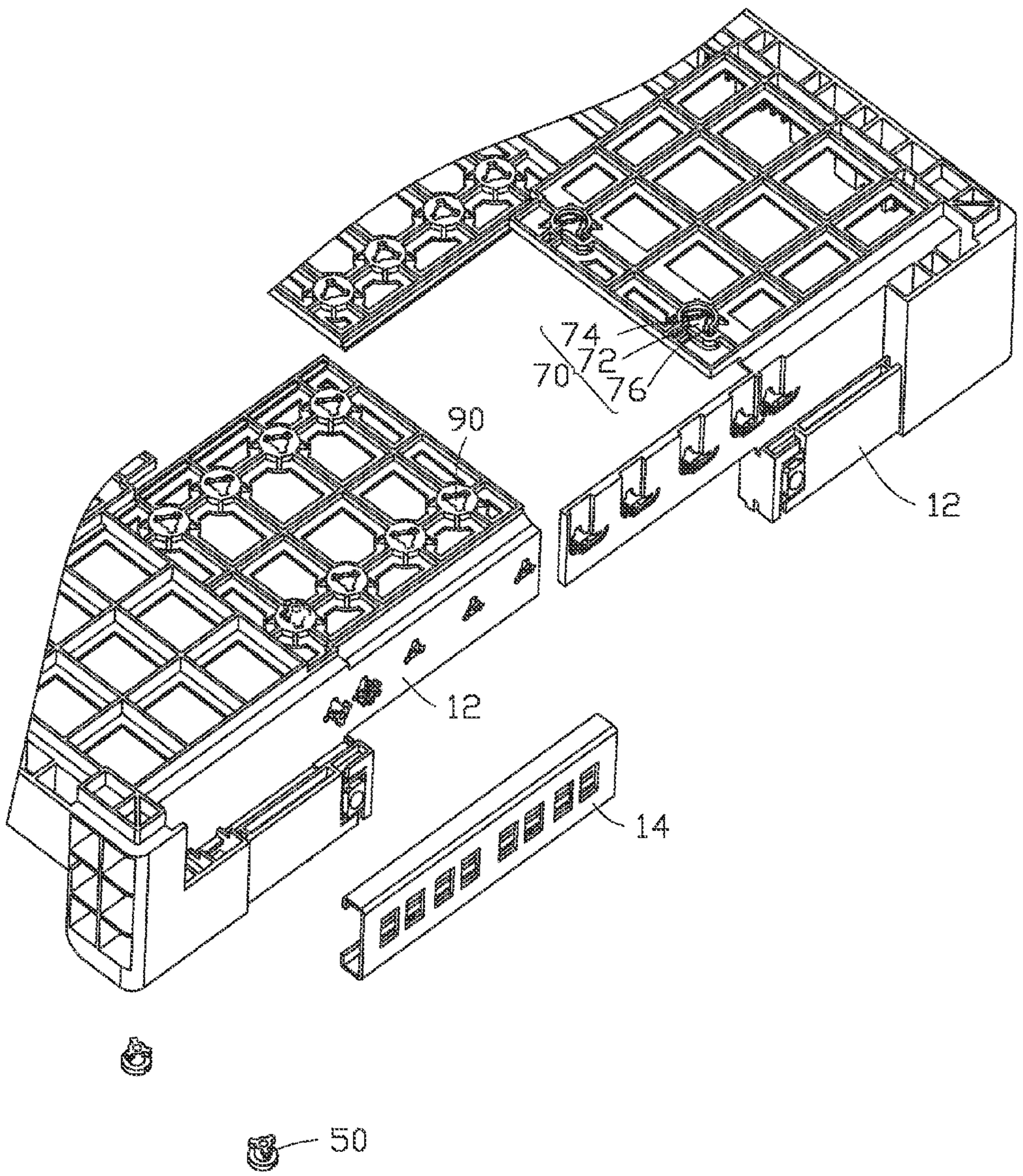

FIG. 3

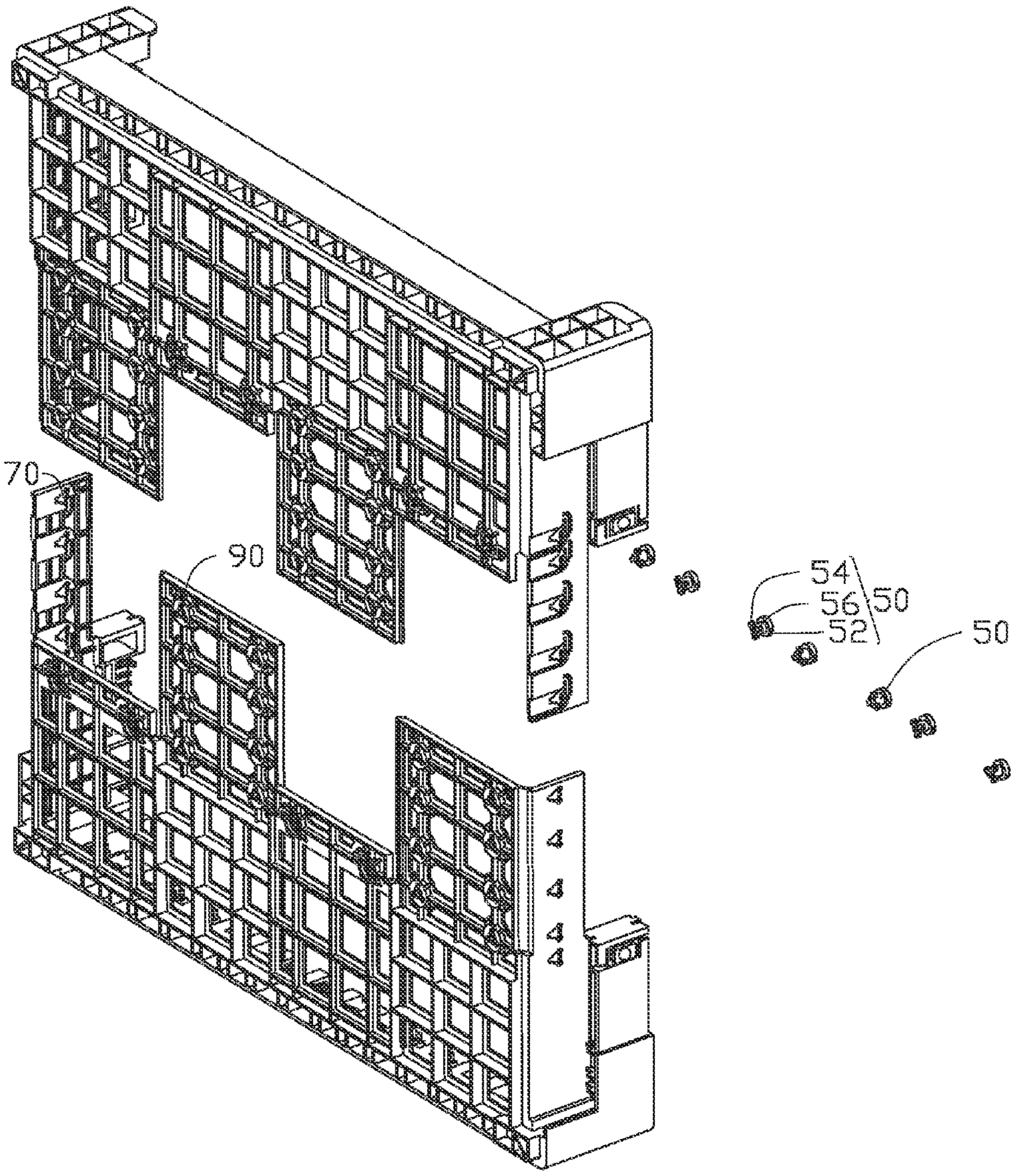

FIG. 4

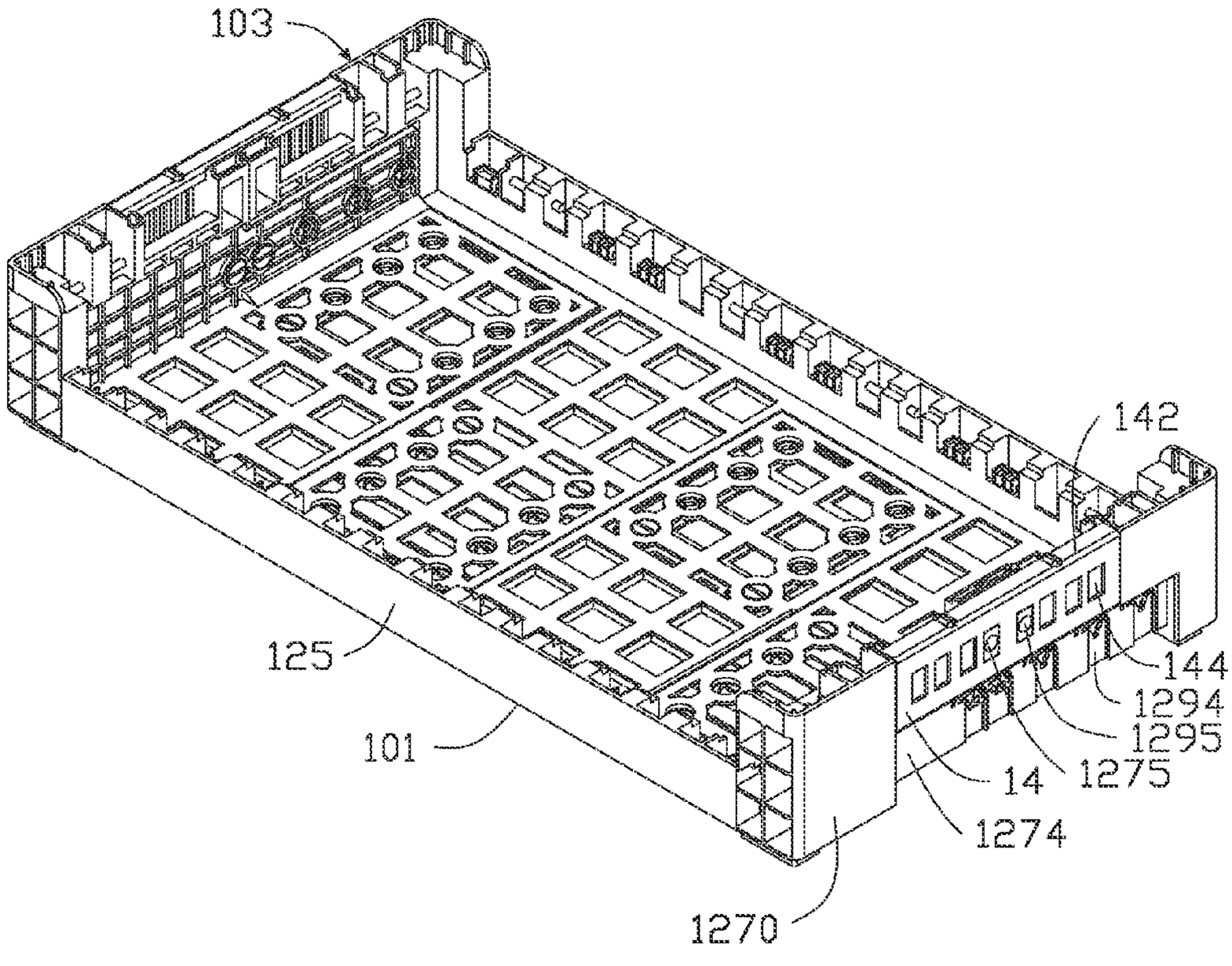

FIG. 5

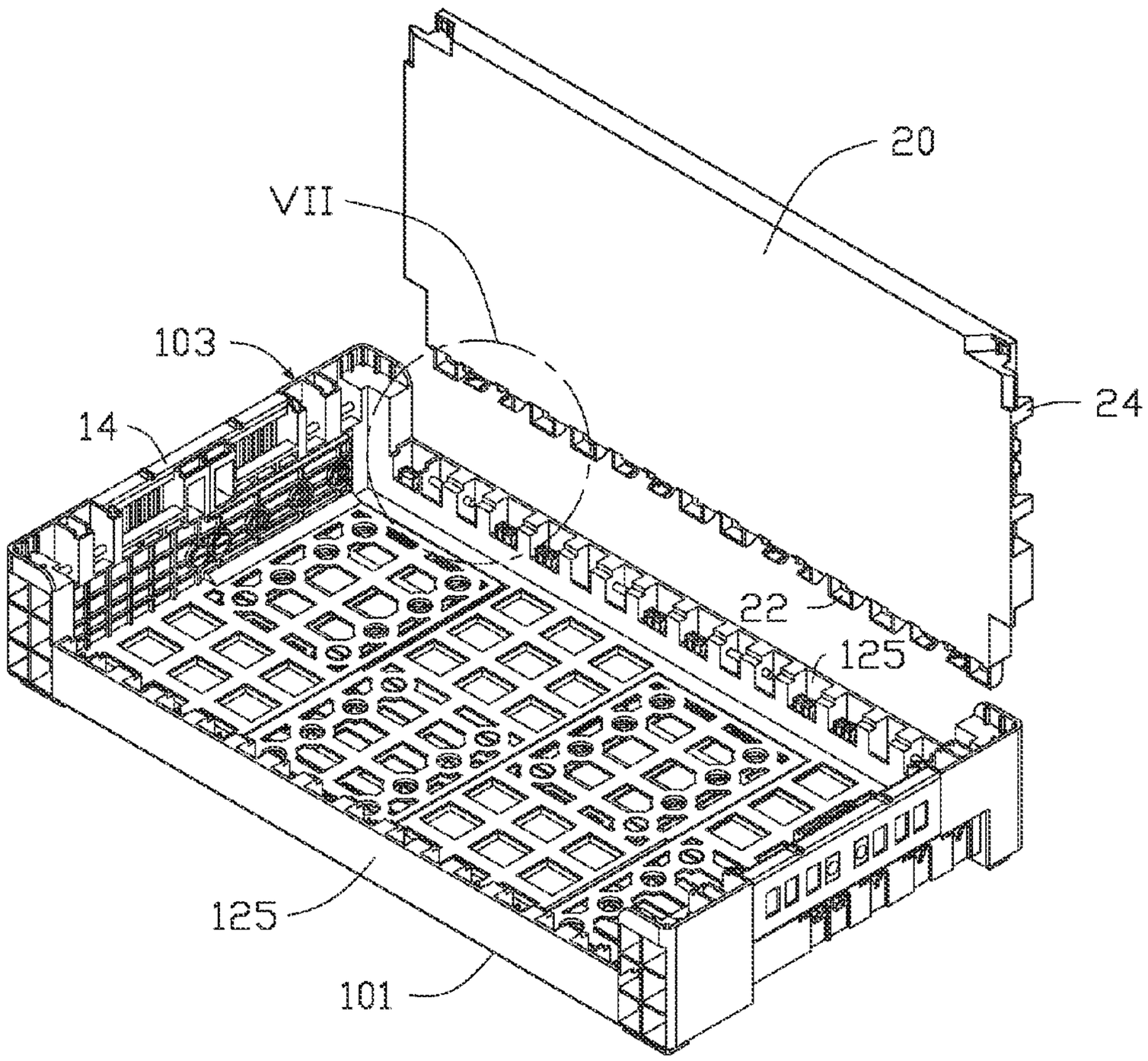

FIG. 6

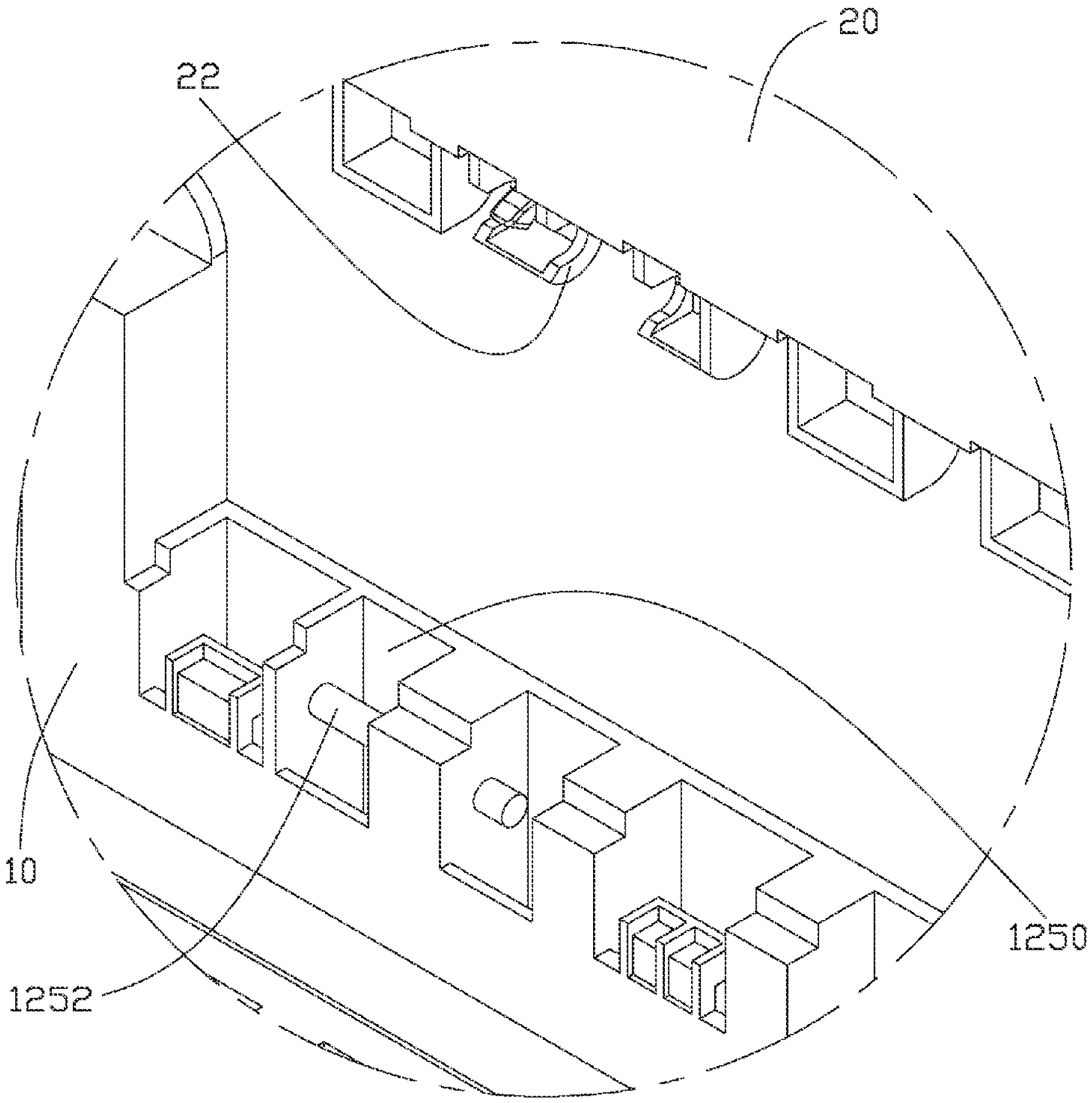

FIG. 7

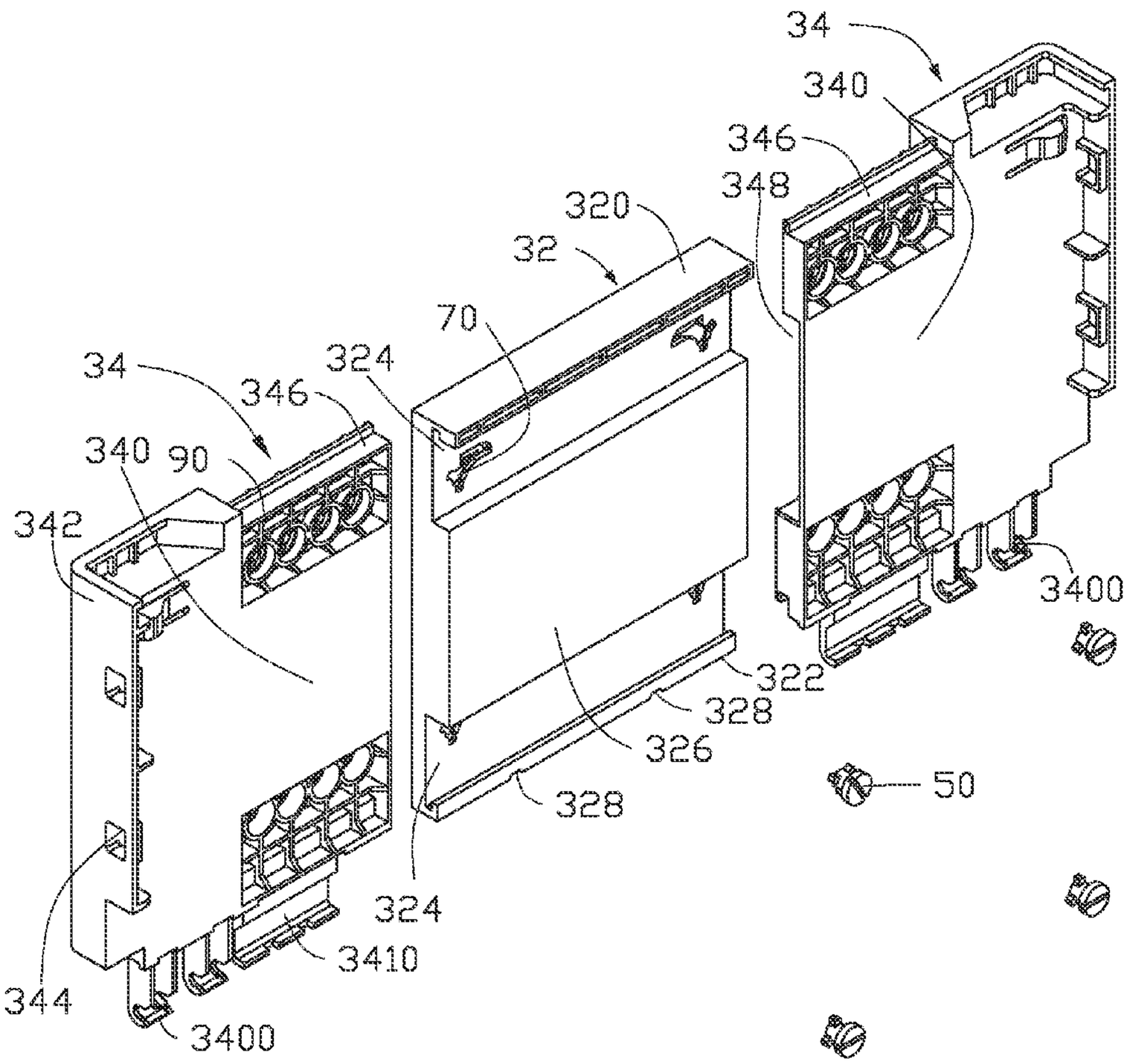
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FIG. 8

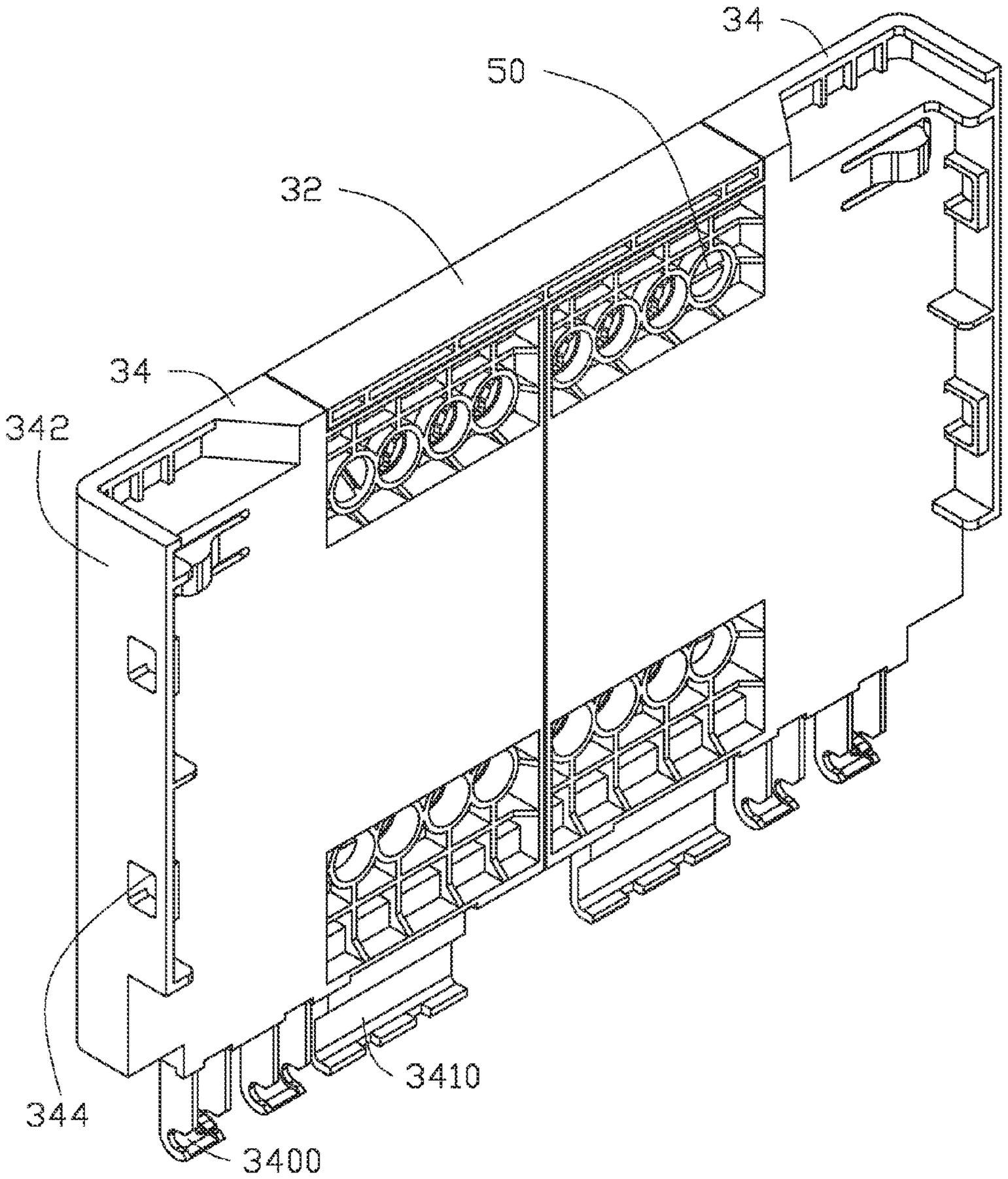

FIG. 9

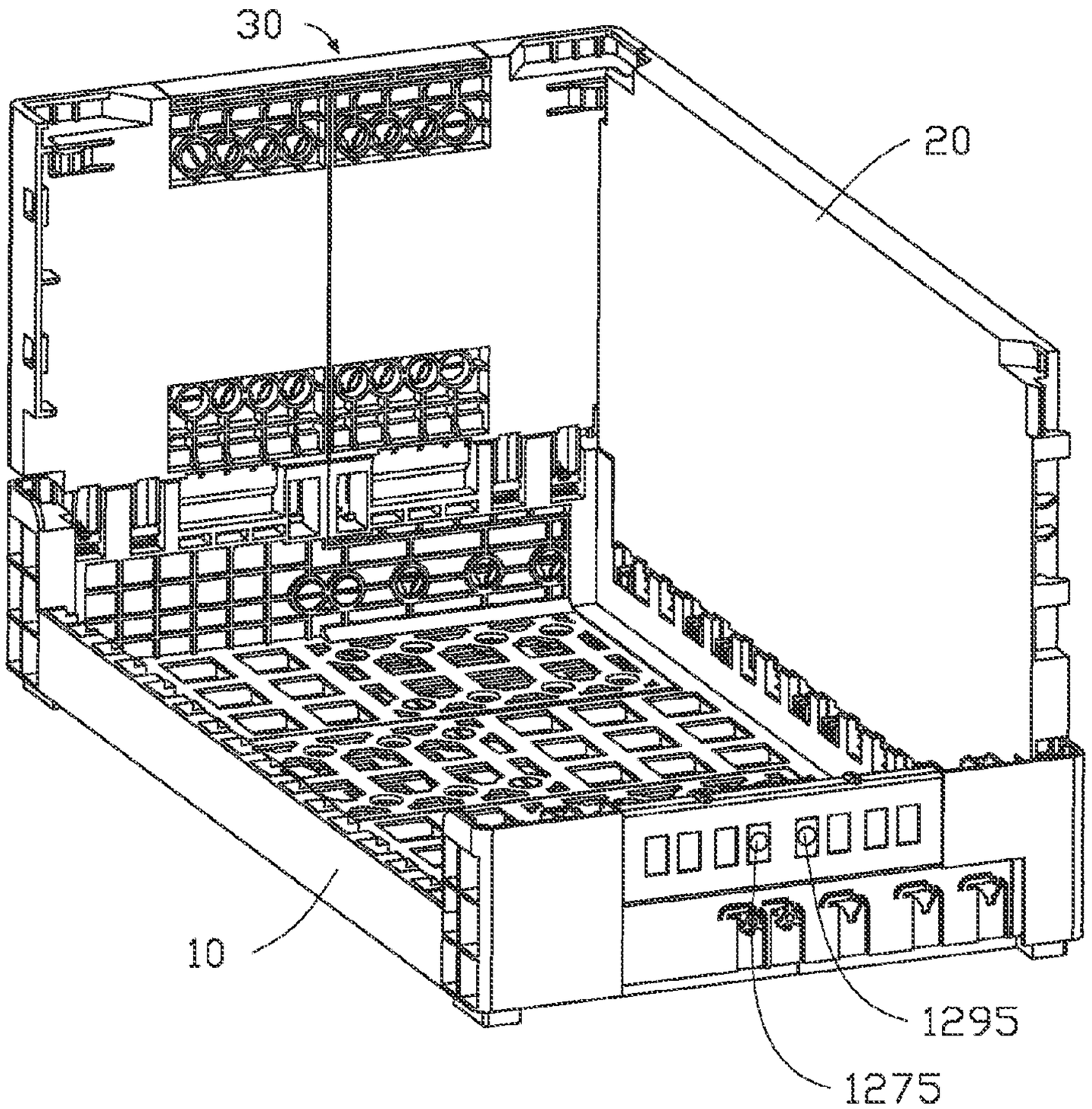

FIG. 10

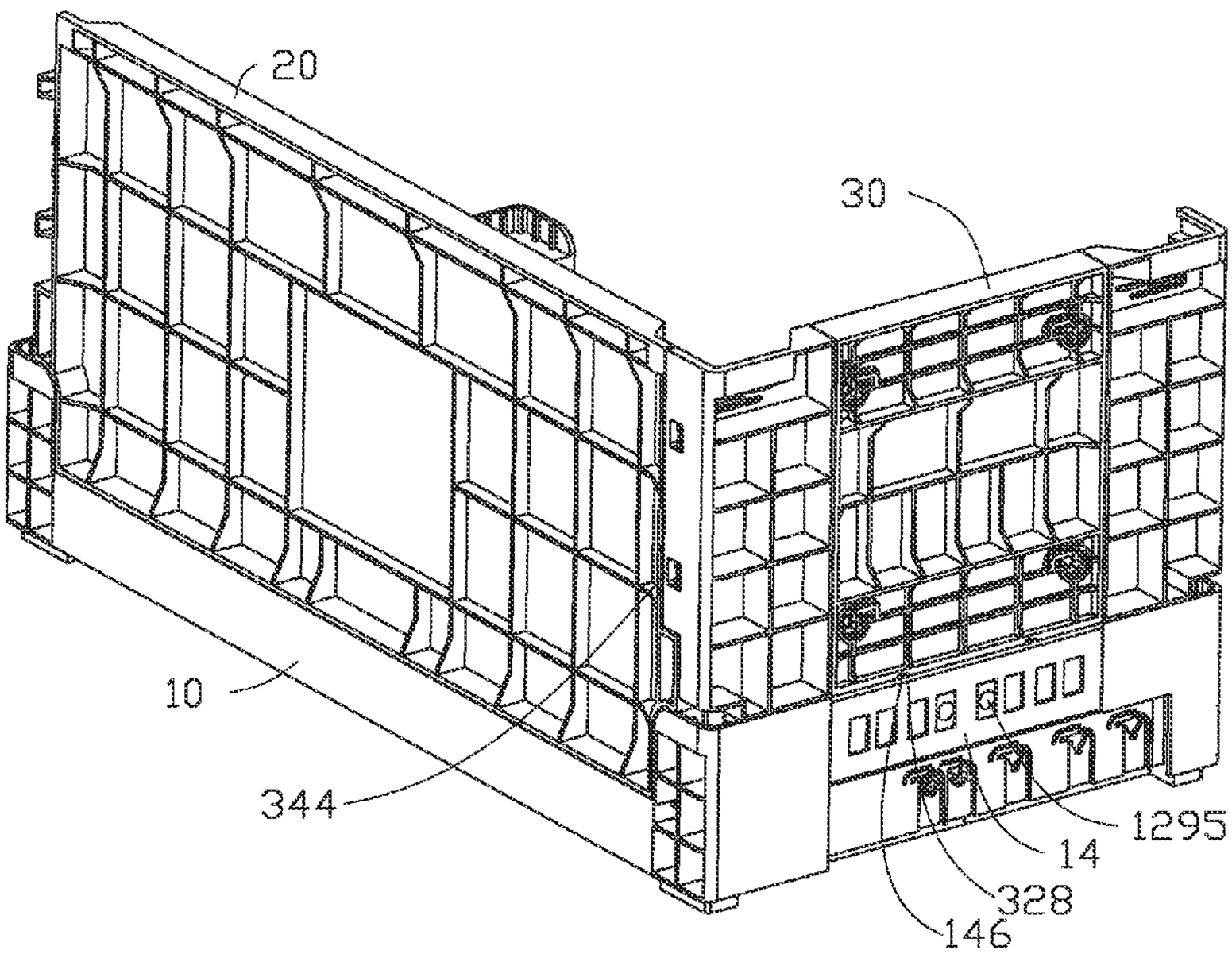

FIG. 11

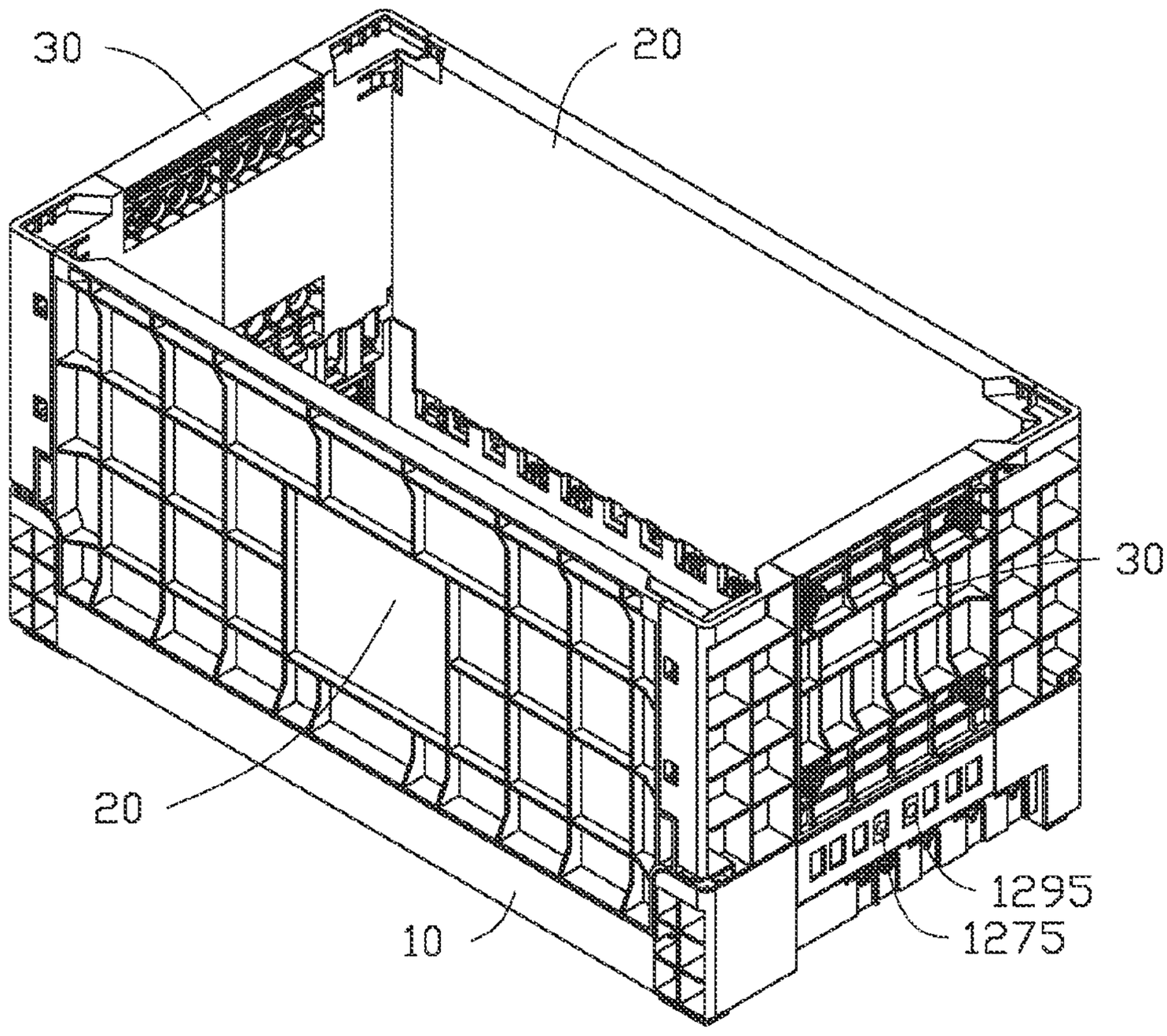

FIG. 12

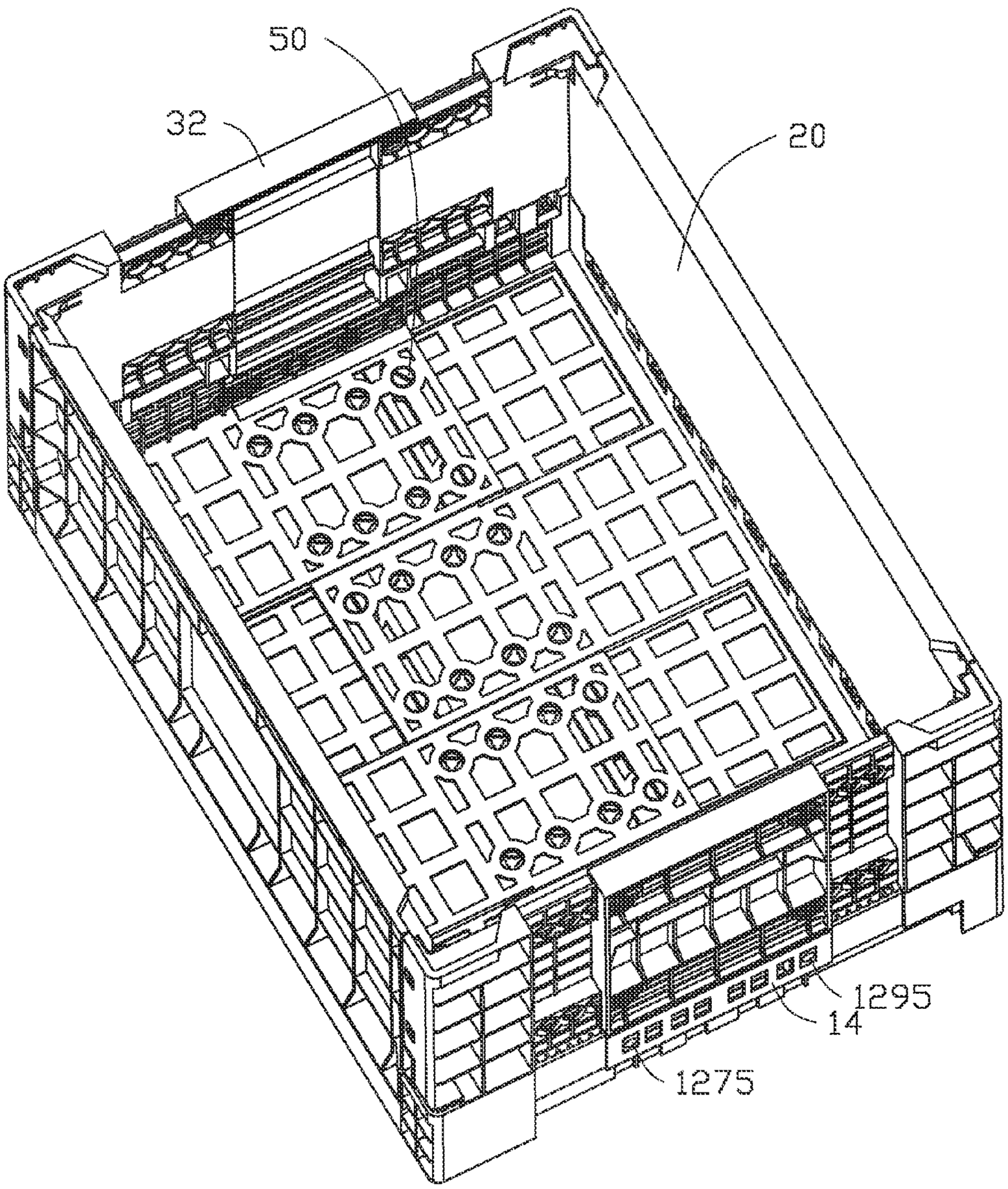

FIG. 13

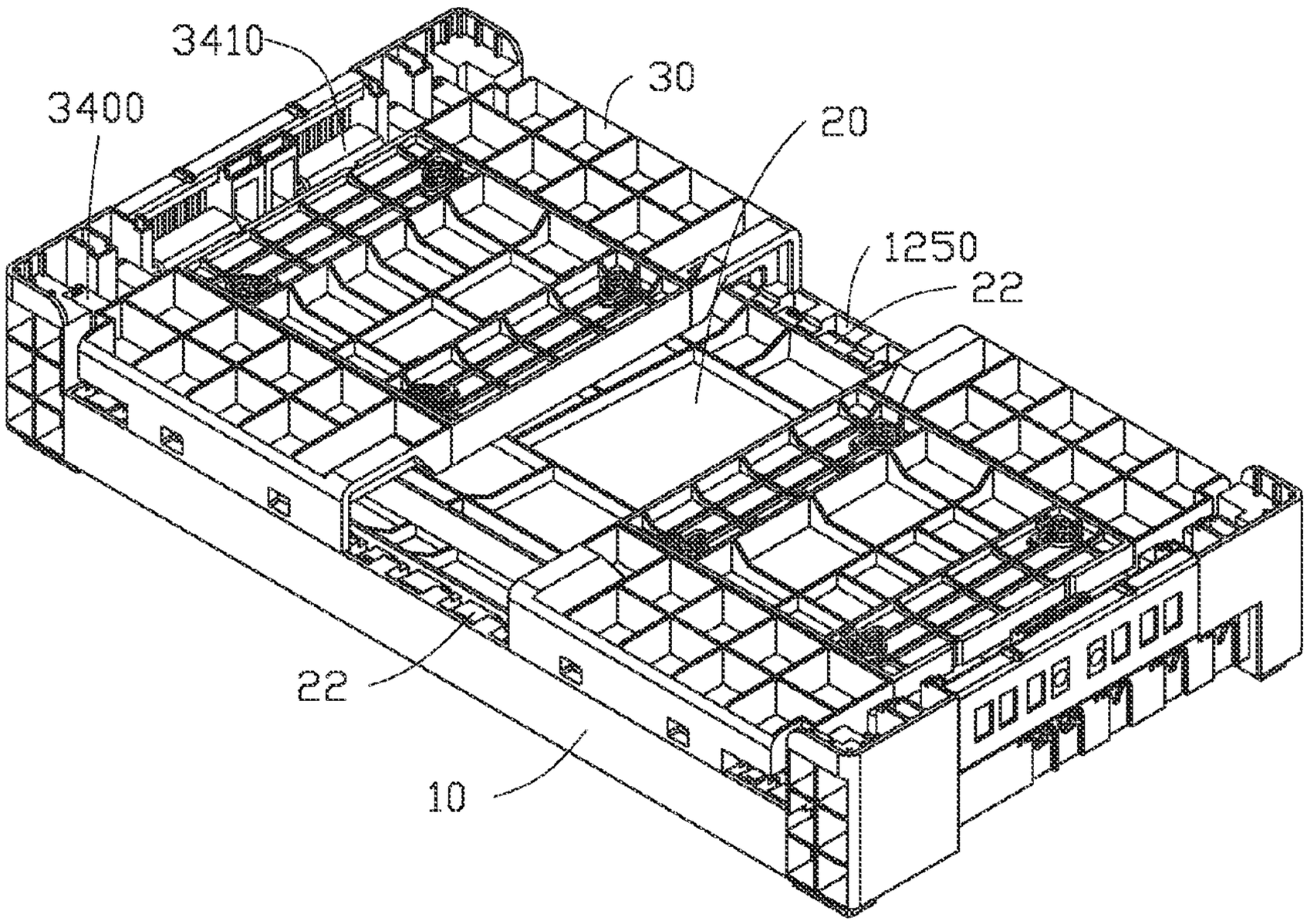

FIG. 14

ADJUSTABLE STORAGE BOX

FIELD

The present disclosure relates to storage boxes, and more particularly to an adjustable storage box.

BACKGROUND

Storage cases are convenient for storage and transportation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an exploded, isometric view of a storage box in accordance with an embodiment of the present disclosure.

FIG. **2** is an exploded, isometric view of a base of the storage box in FIG. **1**.

FIG. **3** is an enlarged view of a part of the base in FIG. **2**, viewed from a different angle.

FIG. **4** is an exploded, isometric view of the base in FIG. **2**, viewed from a different angle.

FIG. **5** is an assembled, isometric view of the base in FIG. **2**.

FIG. **6** is an enlarged, isometric view of a base and a first side plate of the storage box in FIG. **1**.

FIG. **7** is an enlarged view of circled portion VII in FIG. **6**.

FIG. **8** is an exploded, isometric view of a second side plate of the storage box in FIG. **1**.

FIG. **9** is an assembled, isometric view of the second side plate in FIG. **8**.

FIG. **10** is an assembled, isometric view of a base, a first side plate and a second side plate of the storage box in FIG. **1**.

FIG. **11** is another view of FIG. **10**, viewed from a different angle.

FIG. **12** is an assembled, isometric view of the storage box in FIG. **1**, wherein the storage box has a first width.

FIG. **13** is an assembled, isometric view of the storage box in FIG. **1**, wherein the storage box has a second width.

FIG. **14** is an assembled, isometric view of the storage box in FIG. **1**, wherein the storage box is in a folded state.

DETAILED DESCRIPTION

It will be appreciated that for simplicity and clarity of illustration, where appropriate, reference numerals have been repeated among the different figures to indicate corresponding or analogous elements. In addition, numerous specific details are set forth in order to provide a thorough understanding of the embodiments described herein. However, it will be understood by those of ordinary skill in the art that the embodiments described herein can be practiced without these specific details. In other instances, methods, procedures and components have not been described in detail so as not to obscure the related relevant feature being described. The drawings are not necessarily to scale and the proportions of certain parts may be exaggerated to better illustrate details and features. The description is not to be considered as limiting the scope of the embodiments described herein.

Several definitions that apply throughout this disclosure will now be presented.

The term "coupled" is defined as connected, whether directly or indirectly through intervening components, and is not necessarily limited to physical connections. The connection can be such that the objects are permanently connected or releasably connected. The term "substantially" is defined to be essentially conforming to the particular dimension, shape

or other word that substantially modifies, such that the component need not be exact. For example, substantially cylindrical means that the object resembles a cylinder, but can have one or more deviations from a true cylinder. The term "comprising" means "including, but not necessarily limited to"; it specifically indicates open-ended inclusion or membership in a so-described combination, group, series and the like.

The present disclosure is described in relation to a storage box. The storage box can include a base, two opposite first side plates coupled to the base and two opposite second side plates coupled to the base and connecting the two first side plates. The base can include two base plates coupled to each other. Each base plate can include a fixing flange, a first sliding flange and a second sliding flange respectively extending from two opposite ends of the fixing flange. The two first side plates are pivotally coupled to the fixing flanges of the base plates of the base. The two second side plates each can include two sliding plates respectively and pivotally coupled to the first sliding flange of a corresponding one of the base plates and the second sliding flange of the other one of the base plates. The two base plates are configured to be movable relative to each other. The two sliding plates of each second side plate are configured to be movable relative to each other.

FIG. **1** illustrates a storage box in accordance with an embodiment of the present disclosure. The storage box can include a base **10**, two opposite first side plates **20** coupled to the base **10**, and two opposite second side plates **30** coupled to the base **10** and connecting the two first side plates **20**.

As illustrated in FIG. **1** and FIG. **2**, the base **10** can include two base plates **12** coupled to the each other, and two coupling members **14** slidably connecting the two base plates **12**. In this embodiment, the two base plates **12** can be spliced to each other and move relative to each other.

Each base plate **12** can include two spaced recess plates **121** and two spaced protrusion plates **123** staggered with the recess plates **121**. The recess plates **121** of each base plate **12** are corresponding to the protrusion plates **123** of the other one of the base plates **12**. The two spaced recess plates **121** and two spaced protrusion plate **123** of each base plates **12** cooperatively define a bottom face **120**. Two bottom faces **120** of the two base plates **12** are joined together to define a base face **101**. The base plates **12** each have a side vertically extending upwardly to form a fixing flange **125**. The base plates **12** each have two ends thereof extending upwardly to form a first sliding flange **127** and a second sliding flange **129**, respectively. Each recess plate **121** defines two spaced mounting holes **70** in a side thereof away from the fixing flange **125**. Each protrusion plate **123** defines four spaced perforations **90** at a side thereof away from the fixing flange **125**. Each fixing flange **125** has an inner side thereof defining a plurality of installing grooves **1250**. Some of the installing grooves **1250** are engaged with a pivot **1252**. The pivot **1252** can be a cylindrical shaft.

The first sliding flange **127** can include a first fixing seat **1270** extending from an end of the fixing flange **125**, a first installing arm **1272** and a first sliding arm **1274** both extending from a side of the first fixing seat **1270** away from the fixing flange **125**. The first fixing seat **1270** has an inner side defining two spaced installing grooves **1271** each having a pivot **1273** engaged therein. The first installing arm **1272** is stacked on the first sliding arm **1274**. Each base plate **12** has the first installing arm **1272** remote from the recess plate **121**, and the first sliding arm **1274** adjacent to the corresponding recess plate **121**. The first installing arm **1272** and the first sliding arm **1274** both can substantially perpendicular to the fixing flange **125**. The first installing arm **1272** can have an outer side thereof forming an indicating button **1275**, the

indicating button **1275** can be located at an end of the first installing arm **1272** remote from the fixing seat **1270**. The first installing arm **1272** can have an inner side thereof forming a catch **1276** opposite to the indicating button **1275**. The catch **1276** can define two spaced slots **1277** in top and bottom ends thereof. The first sliding arm **1274** can define a plurality of spaced mounting holes **70** in alignment with each other. In this embodiment, there are five mounting holes **70** spaced from each other at regular intervals.

The second sliding flange **129** can include a second fixing seat **1290** coupled to an end of the fixing flange **125**, and a second installing arm **1292** and a second sliding arm **1294** both extending from a side of the second fixing seat **1290** away from the fixing flange **125**. The second fixing seat **1290** has an inner side defining two spaced installing grooves **1291**, each having a pivot **1293** engaged therein. The second installing arm **1292** is stacked on the second sliding arm **1294**. Each base plate **12** has the second installing arm **1292** remote from the protrusion plate **123**, and the second sliding arm **1294** adjacent to the corresponding protrusion plate **123**. Both the second installing arm **1292** and the second sliding arm **1294** can be substantially perpendicular to the fixing flange **125**. The second installing arm **1292** can have an outer side thereof forming an indicating button **1295**. The indicating button **1295** can be located at an end of the second installing arm **1292** remote from the fixing seat **1290**. The second installing arm **1292** can have an inner side thereof forming a catch **1296** opposite to the indicating button **1295**. The catch **1296** can define two spaced slots **1299** in top and bottom ends thereof. The second sliding arm **1294** can define a plurality of spaced perforations **90** in alignment with each other. In this embodiment, there are five perforations **90** spaced from each other at regular intervals.

Each coupling member **14** is configured to couple the first sliding flange **127** of one of the base plates **12** and the second sliding flange **129** of the other of the base plates **12**. Each coupling member **14** can include a face plate **140** and two fastening plates **142** extending from top and bottom sides of the face plate **140**. The face plate **140** can define two units of windows **144**, each unit of windows **144** can include four windows **144** spaced from each other with an interval. The windows **144** of the two units can be in alignment with each other. The fastening plate **142** extending from the top side of the face plate **140** can extend two spaced lugs **146** outwardly. In this embodiment, the coupling member **14** is substantially C-shaped. Each fastening plate **142** can comprise a main portion substantially perpendicular to the face plate **140** and a coupling edge extending from the main body and substantially parallel to the face plate **140**.

Referring to FIGS. **3-5**, when assembling the base **10**, the two base plats **12** are arranged to face each other, the first installing arms **1272** and the second installing arms **1292** face each other respectively and are received in corresponding coupling members **14**, and the coupling edges of the coupling member **14** are retained in the slots **1279**, **1299** of the catches **1276**, **1296**. The first sliding arm **1274** slides on a face of the second sliding arm **1294**, and the protrusion plates **123** slide on faces of the recess plates **121**, until the indicating buttons **1275**, **1295** of the first installing arms **1272** and the second installing arms **1292** are received in the windows **144** of the face plates **140** of the two coupling members **14**. Here, the mounting holes **70** of the first sliding arm **1274** can correspond to the perforations **90** of the second sliding arm **1294**. Fasteners **50** can extend through the perforations **90** and be located in corresponding mounting holes **70**. Therefore, the first sliding arm **1274** of each plate **12** is retained to the second sliding arms **1294** of the other base plate **12**. The first sliding flange **127** and the corresponding second sliding flange **129** can cooperatively form a sliding flange **103** of the base **10**. The protrusion plates **123** of each base plate **12** are located on the recess plates **121** of the other base plate **12**, the mounting holes **70** of the recess plates **121** are corresponding to the perforations **90** of the protrusion plates **123**, fasteners **50** can extend through the perforations **90** of the protrusion plates **123** and be located in the corresponding mounting holes **70** of the recess plates **121**, therefore, the two base plates **12** are retained together.

In this embodiment, the fastener **50** can include a head **52**, a claw **54** and a neck **56** located between and connecting the head **52** and the claw **54**. The perforation **90** has a profile equal to that of the fastener **50**. The mounting hole **70** can include a pre-hole **72** having a profile equal to that of the perforation **90**, a blocking portion **74** under the pre-hole **72** and an abutting portion **76** located aside the blocking portion **74**. When mounting the fastener **50** to the mounting hole **70**, the claw **54** extends through the pre-holes **72** and located at a side of the blocking portion **74**, the fastener **50** is rotated sixty degrees to have the claw **54** blocked by the blocking portion **74** and the abutting portion **76**. When detaching the fastener **50** from the mounting hole **70**, the fastener **50** is rotated sixty degrees inversely, the claw **54** is disengaged with the blocking portion **74** and the abutting portion **76**, the fastener **50** can be taken out of the pre-hole **72**.

Referring to FIGS. **6-7**, the first side plate **20** can has a length equal to that of the fixing flange **125**. The first side plate **20** can form a plurality of grabs **22** configured to be coupled to the installing grooves **1250** of the fixing flange **125**. The grabs **22** can extend from a bottom side of the first side plate **20** toward the fixing flange **125**. Some of the grabs **22** are configured to engage with the pivots **1252** in the installing grooves **1250**. The first side plate **20** can extend two buckles **24** outwardly from each of two opposite lateral sides of the first side plate **20**.

Referring to FIG. **1** and FIG. **8**, the second side plate **30** can include a middle plate **32**, and two sliding plates **34** located at two opposite sides of the middle plate **32** respectively. The middle plate **32** can include a top face **320** and bottom face **322**. The middle plate **32** can define two engaging grooves **324** adjacent to the top face **320** and the bottom face **322** respectively. Each engaging groove **324** can define two mounting holes **70** in two end portions of the engaging groove **324**. The middle plate **32** can form a protrusion portion **326** between the two engaging grooves **324**. The bottom face **322** defined two spaced recesses **328** configured to match the lugs **146** of the coupling member **14**. Each sliding plate **34** can include a sliding face plate **340** and an installing face plate **342** substantially perpendicularly extending from a side of the sliding face plate **340**. The installing face plate **342** can define two fixing holes **344** configured to receive the buckles **24** of the first side plate **20**. The sliding face plate **340** defines a receiving groove **348** in a middle portion of an outer side remote from the installing face plate **342**. The sliding face plate **340** can form two sliding portions **346** at two opposite sides of the receiving grooves **348**. Each sliding portion **346** can define a plurality of perforations **90** corresponding to the mounting holes **70** in the corresponding engaging groove **324**. In this embodiment, there are four perforations **90** in the sliding portion **346** spaced to each other at regular intervals. The two sliding portions **346** each extend two spaced grabs **3400** configured to be coupled to the installing grooves **1291** of the second fixing seat **1290**. The two sliding portions **346** each can further extend an installing board **3410** adjacent to the middle plate **32**.

Referring to FIG. **9**, when assembling the second side plate **30**, the two sliding plates **34** each have the two sliding portions **346** inserted into the engaging grooves **324** of the middle plate **32**. The protrusion portion **326** of the middle plate **32** is received in the receiving grooves **348** of the two sliding plates **34**. The mounting holes **70** in the engaging grooves **324** correspond to the perforations **90** of the two sliding portions **346**. Fasteners **50** can extend through the perforations **90** and are located into the mounting holes **70**. Therefore, the two sliding plates **34** are retained to the middle plate **32**.

Referring to FIGS. **10-12**, when assembling the storage box, the first side plate **20** has the grabs **22** received in the installing grooves **1250** of a corresponding fixing flange **125**, some of the grabs **22** rotatably engage the pivots **1252** in the installing grooves **1250**, thereby pivotally coupling the first side plate **20** to the fixing flange **125**. One of the second side plates **30** has the grabs **3400** received in the installing grooves **1291** of a corresponding second fixing seat **1290** and rotatably engage the pivots **1293** in the installing grooves **1291**. The other of the second side plates **30** has the grabs **3400** received in the installing grooves **1271** of a corresponding first fixing seat **1270** and rotatably engage the pivots **1273** in the installing grooves **1271**. The second side plate **30** has the installing board **3410** installed to an inner side of the coupling member **14**, thereby pivotally coupling the second side plate **30** to the first sliding flange **127** and the second sliding flange **129** of the base **10**. The coupling member **14** has the lugs **146** engaged in the recesses **328** of the middle plate **32** of the second side plate **30**. The first side plate **20** has the buckles **24** engaged into the fixing holes **344** of the installing face plate **342** of the second side plate **30**, thereby coupling the first side plate **20** to the second side plate **30**.

Referring to FIG. **13**, when the storage box is to be adjusted to have a first width, the first width can be a maximum width between the two first side plates **20**, the fasteners **50** are removed, the two base plates **12** are drawn outwardly from the coupling members **14**, and the two second side plates **30** each have the two sliding plates **34** moving outwardly from the middle plate **32**, the coupling member **14** is unmovable relative to the middle plate **32** via the lugs **146** of the coupling member **14** engaging in the recesses **328** of the middle plate **32**. When the indicating buttons **1275**, **1295** of the first installing arm **1272** and the second installing arm **1292** are respectively received in two outermost windows **144** of the coupling member **14**, the mounting holes **70** of the recess plates **121** correspond to two outmost perforations **90** of the protrusion plates **123** of the base plates **12**, the fasteners **50** are extended through the perforations **90** and are locked in the mounting holes **70**. Therefore, the storage box having the maximum width is obtained.

Referring to FIG. **12**, when the storage box is to be adjusted to have a second width, the second width can be a minimum width between the two first side plates **20**, the fasteners **50** are removed, the two base plates **12** are inserted into the coupling members **14**, and the two second side plates **30** each have the two sliding plates **34** moving toward the middle plate **32**. The coupling member **14** is unmovable relative to the middle plate **32** via the lugs **146** of the coupling member **14** engaging in the recesses **328** of the middle plate **32**. When the indicating buttons **1275**, **1295** of the first installing arm **1272** and the second installing arm **1292** are respectively received in two innermost windows **144** of the coupling member **14**, the mounting holes **70** of the recess plates **121** correspond to two innermost perforations **90** of the protrusion plates **123** of the base plates **12**. The fasteners **50** can be extended through the perforations **90** and are locked in the mounting holes **70**. Therefore, the storage box having the minimum width is obtained.

It can be understood that the storage box can be adjusted to have other widths by moving the base plates **12** and the sliding boards **34**, until the indicating buttons **1275**, **1295** are received in corresponding windows **44**, the fasteners **50** are engaged in the mounting holes **70** and corresponding perforations **90**.

Referring to FIG. **14**, when the storage box is to be folded, the two first side plates **20** are pressed toward each other to have the buckles **24** of the first side plates **20** disengaged from the fixing holes **344** of the second side plates **30**. The two first side plates **20** are arranged on the base plates **12**, the two second side plates **30** are folded toward the base **10** to be located on the first side plates **20**.

The embodiments shown and described above are only examples. Even though numerous characteristics and advantages of the present technology have been set forth in the foregoing description, together with details of the structure and function of the present disclosure, the disclosure is illustrative only, and changes may be made in the detail, including in matters of shape, size and arrangement of the parts within the principles of the present disclosure up to, and including, the full extent established by the broad general meaning of the terms used in the claims.

What is claimed is:

1. A storage box comprising:

a base comprising two base plates coupled to each other, each base plate comprising a fixing flange, a first sliding flange and a second sliding flange respectively extending from two opposite ends of the fixing flange;

two opposite first side plates pivotally coupled to the fixing flanges of the base plates of the base; and

two opposite second side plates each comprising two sliding plates, the two sliding plates of each of the second side plates respectively and pivotally coupled to the first sliding flange of a corresponding one of the base plates and the second sliding flange of the other one of the base plates;

wherein the two base plates are configured to be movable relative to each other, the two sliding plates of each second side plate are configured to be movable relative to each other.

2. The storage box of claim **1**, wherein each of the base plates can further comprises two spaced recess plates and two spaced protrusion plates staggered with the recess plates, the recess plates of each of the base plates being corresponding to the protrusion plates of the other one of the base plates.

3. The storage box of claim **2**, wherein the first sliding flange of each of the two base plates is coupled with the second sliding flange of the other of two base plates via a coupling member.

4. The storage box of claim **1**, wherein the first siding flange and the second sliding flange are substantially perpendicular to the fixing flange.

5. The storage box of claim **3**, wherein the first sliding flange comprises a first fixing seat coupled to an end of the fixing flange and a first installing arm extending from the first fixing seat and away from the fixing flange, the second sliding flange comprising a second fixing seat coupled to an opposite end of the fixing flange and a second installing arm extending from the second fixing seat and away from the fixing flange, the first installing arm and the second installing arm facing each other and being received in a corresponding coupling member.

6. The storage box of claim 5, wherein the coupling member comprises a face plate and two fastening plates extending from two opposite sides of the face plate, the first installing arm and the second installing arm each comprising a catch defining two slots, the fastening plates being stuck in the slots.

7. The storage box of claim 6, wherein the face plate defines a plurality of spaced windows, the first installing arm and the second installing arm each further comprising an indicating button, the indicating buttons being received in corresponding windows.

8. The storage box of claim 7, wherein the indicating button is opposite to the catch on the first installing arm or the second installing arm.

9. The storage box of claim 5, wherein the first sliding flange further comprises a first sliding arm extending from the first fixing seat and away from the fixing flange, the second sliding flange comprising a second sliding arm extending from the second fixing seat and away from the fixing flange, the first sliding arm defining a plurality of spaced mounting holes, the second sliding arm defining a plurality of spaced perforations corresponding to the mounting holes, the mounting holes and the perforations being configured to receive a fastener to retain the first sliding arm with the second sliding arm.

10. The storage box of claim 9, wherein each of the base plates has the first installing arm stacked on the first sliding arm, and the second installing arm stacked on the second sliding arm.

11. The storage box of claim 1, wherein the fixing flange has an inner side thereof defining a plurality of installing grooves, at least one of the installing grooves coupled with a pivot, the first side plate forming at least a grab, the at least a grab being received in the at least one of the installing grooves and engaging with the pivot.

12. The storage box of claim 1, wherein the first sliding flange and the second flange each have an inner side thereof defining a plurality of installing grooves, the installing grooves each coupled with a pivot, the second side plate having the two sliding plates forming a plurality of grabs, the grabs of the sliding plates being received in the installing grooves of the first sliding flange and the second flange and engaging with the pivots.

13. The storage box of claim 3, wherein the second side plate further comprises a middle plate located between the two sliding plates, the two sliding plates being slidably coupled to the middle plate, the middle plate being coupled to the coupling member.

14. The storage box of claim 13, wherein the middle plate defines a recess, the coupling member extending a lug corresponding to the recess and configured to be engaged in the recess.

15. The storage box of claim 13, wherein the middle plate comprises two spaced engaging grooves and a protrusion portion located between the two engaging grooves, each of the sliding plates comprising a sliding face plate and an installing face plate extending from a side of the sliding face plate, the sliding face comprising a receiving groove receiving the protrusion portion, and two sliding portions at two opposite sides of the receiving grooves, the two sliding portions being received in the two engaging grooves, respectively.

16. The storage box of claim 15, wherein the engaging groove defines two mounting holes in two end portions thereof, the installing face plate defining a plurality of perorations corresponding to the mounting holes in the engaging groove, configured to receive fasteners to retain the sliding plates with the middle plate.

17. The storage box of claim 16, wherein the installing face plate defines a fixing hole configured to receive a buckle of the first side plate.

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